



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
URANIUM RECOVERY FIELD OFFICE  
BOX 25325  
DENVER, COLORADO 80225

Docket No. 40-8584  
SUA-1350

APR 22 1994

Kennecott Uranium Company  
ATTN: Michael H. Gibson  
Caller Box 3009  
Gillette, Wyoming 82717

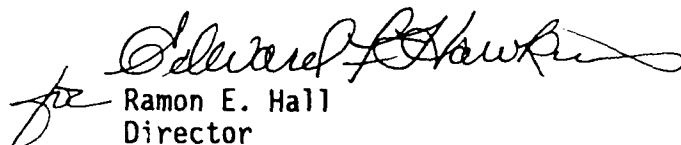
Dear Mr. Gibson:

We have completed a preliminary review of your July 1993 Conceptual Design for the Sweetwater Uranium Project, which you submitted by letter dated August 17, 1993. We did not identify any fatal flaws in the conceptual design that would preclude you from proceeding with the final design of the project. Enclosure 1 contains comments that we noted during our preliminary review. However, because the staff did not conduct a detailed review at this time, the comments should not be considered exhaustive.

In your October 29, 1993, letter you summarized the issues of concern involving the conceptual plan that will eventually require approval of either the U.S. Nuclear Regulatory Commission (NRC), the U.S. Environmental Protection Agency (EPA), or both. Although from a regulatory standpoint none of these are considered "fatal flaws," you should note that our final responses to any of them could affect your design. Please refer to Enclosure 2 for a synopsis of the issues, our evaluation of the key elements to be considered, and the status to date on addressing them. To summarize, discussions have been initiated between the EPA, the NRC Uranium Recovery Field Office, and the NRC Division of Waste Management in Washington, D.C.

If you have any questions regarding this letter or its enclosures, please contact Mr. Ray Gonzales of my staff at (303) 231-5808 or Mr. Daniel Gillen of our program office at (301) 504-2517.

Sincerely,

  
for Ramon E. Hall  
Director

Enclosures:  
As stated

Kennecott Uranium Company

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APR 22 1994

cc:

O. Paulson, Kennecott

J. Hough, RCPD, WY

D. Finley, DEQ, WY

WDEQ-LQD

SPECIFIC REVIEW COMMENTS  
SWEETWATER URANIUM PROJECT  
CONCEPTUAL DESIGN  
TAILINGS MANAGEMENT STUDY

1. Soil Testing - In general, the exploration plan and laboratory testing program appear inadequate to substantiate representativeness. The use of peak strength  $\phi$  (phi) angles resulting from direct shear tests will not be considered appropriate for stability determinations without further justification.
2. Settlement - A settlement analysis was not presented as suggested in Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills," Revision 2, December 1977. An analysis should be provided which considers settlement for both the tailings embankments and the evaporation pond subgrade. In addition, an analysis of potential cover cracking should be presented.
3. Stability - The conceptual plan modeled the appropriate sections; however, the modeling did not include provisions for analyzing the soil/geomembrane interface. Also, as discussed above, the soil parameters used in the analysis will require additional justification.
4. Radon Barrier - Several of the parameters used to model the required thickness of the radon barrier are not conservative or representative. For example, the long-term moisture content of the radon barrier and the Ra-226 concentration and distribution in the upper portion of the tailings are not considered to be representative. All parameters will need to be fully justified in the final design. Also, the potential for damage to the radon barrier from biointrusion should be addressed in addition to providing further discussion and evaluation of the frost protection layer.
5. Design Floods - The magnitudes of the design floods (PMFs) appear low when compared to recorded historic flows in other areas of Wyoming and to PMFs already approved by the NRC for other facilities. Although the staff recognizes that certain conditions may exist to reduce flood peaks in this drainage basin, it is unlikely that the flood peaks are reduced considerably. The staff considers that the most likely errors in the calculations result from using a flood of limited duration, using lag times that do not consider rapid channelization of flows, and from using improper runoff relationships. In order to justify the adequacy of the design floods, all parameters and analytical procedures will need to be presented, along with the bases for your assumptions.
6. Erosion Protection - The conceptual plan includes a diversion ditch to be constructed along the east side of the tailings disposal area. Based

on the drawings presented, it appears that the ditch will cause water to pond between the ditch and the tailings embankments. This potential problem will need to be addressed in the final design.

7. Sedimentation - Sediment deposition in the diversion ditch could impact the ability of the ditch to safely pass the design flood. Demonstration that the ditch is designed to prevent sediment deposition, or that the PMF can still be accommodated without any adverse effects, will need to be documented.
8. Apron/Toe Protection - The reclamation design of the tailings embankments and the diversion ditch outlet will need apron/toe protection to minimize the potential for headcutting.
9. Use of Vegetation - The calculations presented indicate that you plan to take significant credit for the use of vegetation to resist erosion. The staff considers that only a very limited amount of credit can be given for any vegetation other than native vegetation that will exist in the area following site remediation. Your calculations indicate that an allowable shear stress for vegetation is equivalent to large riprap. Such an assumption is unsubstantiated for the vegetation in this arid area of Wyoming; therefore, your calculations for the vegetated cover should be revised.
10. Site Suitability - The final design should discuss the site features that make it suitable for the proposed new disposal cell design and the proposed expansion of waste disposal at the site (to show that the provisions of Criterion 1, Appendix A to 10 CFR Part 40, continue to apply). In addition, information on site characterization should be updated as appropriate, based on site data obtained since the license was issued.
11. Prime Option for Disposal - The final design should address the prime option of fully below-grade disposal, which is required, if practicable, by 10 CFR Part 40, Appendix A, Criterion 3, and justify the proposed partially below grade disposal cell design, considering all of the factors cited in Criterion 3.
12. Cover Design - The closure and reclamation plan may have to provide a cover system whose hydraulic conductivity will be no greater than that of the bottom liner. This would be to ensure that a "bathtub effect" will not be created in the reclaimed tailings cells. This must be considered even if the annual evaporation rate in the site area exceeds the annual precipitation. Alternatively, you must demonstrate that the projected buildup of liquids above the liner during the closure period will not be of such magnitude as to negatively affect the structural integrity of the reclaimed cells or cause contaminant buildup above established standards, in the ground water.
13. Ground-Water Protection - The final design should discuss if and how the proposed design will impact ground-water protection provisions and plans that are in effect under the present license. This should include

requirements of 10 CFR Part 40, Appendix A, such as updating the location and number of the point of compliance wells (Criterion 5B), and establishing a ground-water monitoring program (Criteria 7 and 7A).

14. Environmental Impacts - Since the conceptual plan proposes to construct up to six new tailings disposal cells and to use the existing disposal cell as an evaporation pond, you will be required to either provide an Environmental Report as required by 10 CFR Part 51.60 (b)(2), or provide justification for a categorical exclusion in accordance with the requirements of 10 CFR Part 51.22.

## DISCUSSION OF ISSUES IN KENNECOTT'S OCTOBER 29, 1993 LETTER

Based on our review of your letter of October 29, 1993, there are several issues that need further review and discussion. These are as follows:

(1) use of the existing tailings impoundment as an evaporation pond during operation; (2) use of two clay liners with a leachate collection system in between; and (3) the effects of the liners remaining in place after reclamation of the tailings cells.

1. The first issue concerns the proposal in the conceptual plan to convert the existing tailings impoundment to an evaporation pond. This proposal hinges on EPA's determination of whether or not the impoundment would fall under 40 CFR Part 61, Subpart T or W. Currently, the tailings impoundment is under Subpart W because it is an operating cell. Subpart W allows the operation of no more than two 40-acre impoundments at any one time. In addition, the impoundments must be double lined and have leak detection systems. Therefore, if the existing impoundment is considered to still be an operating tailings pond under your conceptual plan, only one other pond would be allowed to be operating. You stated that use of the existing impoundment for disposal of tailings would probably not meet regulatory requirements in that the impoundment has a surface area of 60 acres and only a single liner. Since your conceptual plan would actually mean that the existing impoundment would no longer be used to dispose of tailings, it could be interpreted to fall under the requirements of Subpart T. Under this interpretation, the impoundment would have to be reclaimed as expeditiously as practicable, and at least within 7 years. You stated that this would preclude converting the impoundment to an evaporation pond.

This was discussed informally with the U.S. Environmental Protection Agency (EPA) during the U.S. Nuclear Regulatory Commission/American Mining Congress Joint Workshop that was held on March 16-17, 1994. Mr. Paulson of Kennecott participated in some of these discussions, along with Mr. Milt Lammering of EPA Region 8, Ms. Gale Bonnano of EPA Headquarters and Mr. Ed Hawkins of the NRC URFO Office. Since the revisions to both 40 CFR Part 61 and 10 CFR Part 40 are not completed, Subpart T requirements are still under EPA authority. Your question, then, calls for an interpretation by EPA, and Ms. Bonnano agreed to discuss the issue further with the EPA Headquarters and Region 8 staffs. We anticipate a response in the near future. Although we recognize that NRC will also need to make a determination on the acceptability of your proposal, it would be purely speculative until EPA has considered the issue. If EPA were to conclude that your proposal is acceptable, one of our concerns with your proposal would be the suitability of the tailings as a stable base for the synthetic liner. In particular, settlement/consolidation of the tailings under the weight of the evaporation pond could lead to a failure of the synthetic liner, which would result in resaturation of the tailings and subsequent leakage to ground water. You address this issue by stating that the liner will easily handle any settlement of the tailings because it will be made of

a material which has superior elastic qualities. This material is very low density polyethylene (VLDPE). You will be required to provide additional information to substantiate that settlement of the tailings will not lead to failure of the liner. Another concern would be how you would propose to reclaim this impoundment upon closure of the facility.

2. The second issue concerns the liner system proposed for the new tailings impoundments. EPA regulation 40 CFR 264.221(c) requires two or more liners with a leachate collection system in between. The regulation states that the top liner should prevent the migration of any constituent into the liner. A strict interpretation of this regulation is that only a synthetic liner would be acceptable since a clay liner would permit the migration of constituents into the clay. The design you propose for the new cells consists of two compacted clay layers with a leak detection and recovery system in between. In addition, in order to meet the EPA regulation, you propose to place a 60-mil HDPE synthetic liner on top of the upper compacted clay layer. This design however, may be in conflict with NRC's concern that the synthetic liner may create a "bathtub effect" whereby more water will enter the reclaimed cell from the top than will leave the cell from the bottom. Your October 29, 1993, letter states you believe that NRC's concern regarding the "bathtub effect" and the intent of EPA's regulation can both be addressed by eliminating the HDPE synthetic liner and providing two clay liners separated by a leak detection system. If only a portion of the upper (top) liner is subjected to the migration of constituents during operation, the portion of the upper liner, which is subjected to migration of constituents during operation, becomes sacrificial and the remaining top liner becomes the "liner" for the purposes of EPA's regulations.

The NRC's primary standard for ground-water protection is that surface impoundments must have a liner to prevent migration of wastes out of the impoundment to the adjacent subsurface soil, ground water, or surface water at any time during the active life of the impoundment (10 CFR Part 40, Appendix A, Criterion 5A(1)). This criterion also states that wastes may migrate into the liner during the active life of the facility provided that impoundment closure includes removal or decontamination of all waste residues, etc. If the liner is to be left in place, it must be made of materials that prevent waste from migrating into the liner during the active life of the facility. Also, a leak detection system and a drainage system to dewater tailings are required.

With this background, it is not entirely clear that the proposed liner system concept (two clay layers with a HDPE synthetic liner) can strictly comply with both EPA and NRC requirements. It appears, however, that the intent of the regulations could potentially be met by eliminating the HDPE liner and only using two clay layers separated by a leak detection system, as you propose in your October 29, 1993, letter. The intent of these regulations is that wastes are contained within the impoundment, that steps are taken to ensure the integrity of the "primary liner," that excess tailings liquor is drained off, and that there is a leak detection system. Your responsibility will obviously be

to demonstrate that these are met. Please note that although we have not yet discussed your concept with the EPA, we intend to do so in the near future.

3. The third issue involves the question of the disposition of pond liners when the facility is decommissioned and closed. If the liner is left in place, it could potentially create a "bathtub effect" if the permeability of the liner was less than that of the reclamation cover. The "bathtub effect" could potentially have adverse impacts on the structural integrity of impoundments as well as ground-water quality. Specifically, the "bathtub effect" may cause local differential settlement, subsidence, slope instability, and/or a breach in the liner, containment walls, and/or cover. This could result in contaminant seepage into ground and surface water, and possibly uncontrolled release of tailings and contaminated materials to the environment. This issue is currently being reviewed and will be addressed generically in a Policy and Guidance Directive scheduled to be issued in the near future. The focus of this guidance, however, is primarily on what issues need to be considered, not on analytical techniques.